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Revision of *Molobratia* from Japan and Taiwan (Insecta, Diptera, Asilidae)[1]

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ABSTRACT—Six species of *Molobratia* are now known from Japan (4 species) and Taiwan (2 species). *M. takasagense* is synonymized with *M. japonica* and one new species is added from Taiwan. It is found that aedeagus, horizontal branch of dorsodistal process in gonocoxite, male sternum 10, female tergum 8 and female sternum 8 vary in shape with species.

INTRODUCTION

Hull [1] erected the genus *Molobratia* and designated *Asilus teutonus* Linnaeus, 1767 as the type species, because the true type species of *Dasypogon* Meigen, 1803 is not *teutonus,* but *Asilus diadema* Fabricius, 1781, by the designation of Latreille, 1810. *Selidopogon* Bezzi, 1902, whose type species is *diadema*, became a synonym of *Dasypogon.*

From Japan, five described species of *Molobratia* were recorded (Bigot [2]; Matsumura [3]; Hradský [4]). One of them, *takasagense,* is here treated as a junior synonym of *japonica.* At present only one female specimen of *Molobratia* from Taiwan is on hand and this seems to represent a new species. The original description is copied as to *M. purpuripennis* (Matsumura) from Taiwan. Thus, four species from Japan and two species from Taiwan are now recorded as *Molobratia.*

Iwata and Nagatomi [5] treated *Molobratia japonica* and *M. sapporensis* as *Dasypogon,* and recorded their prey: "The delicate wasps such as Ichneumonidae were principally seized" by *sapporensis,* and "The bees were mainly struck" by *japonica.*

Richter (1968) and Weinberg (1970) put *egregia* Loew, 1869 from Transcaucasia and Caucasia into *Molobratia* (after Ionescu and Weinberg [6], p. 137). Weinberg [7] redescribed and illustrated *pekinensis* Bigot, 1878, whose type locality is northern China as *Molobratia,* based on the specimens from Kuantum, Fukien, China. Oldroyd [8] put *inopinata* Walker, 1860 and *inopportuna* Walker, 1860, both from Burma, into *Molobratia.* Unfortunately we have no specimens of *inopinata* and *inopportuna* and cannot compare them with the species from Japan and Taiwan.

PHYLOGENETICALLY RELATED GENERA OF *MOLOBRATIA*

What is the phylogenetically related genus or genara of *Molobratia*? According to Hull [9], it is *Leptarthrus* Stephens, 1829 (=*Isopogon* Loew, 1847), having two species from Europe. In the female tergum 9+10 of *Molobratia* and *Leptarthrus,* a circlet of rod-like spines are absent. On the basis of this character, Hull [9] put these two genera into the tribe Dioctrini. On the other hand, Theodor [10] (p. 27) mentioned that "The tribe Dioctrini of Hull is based on the absence of spines on tergite 9 (=tergum 9+10 or tergum 10 in our interpretation) of the female; however, spines are also absent in some species of other tribes which

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belong to these tribes according to some very distinct characters, while other species have spines on tergite 9. *Dioctria* is here included in the Stenopogoni, as this character does not seem to justify the establishment of a separate tribe." This statement may be correct, and the absence of the spines in question may occur secondarily within the same natural group, as pointed out already by Papavero [11, 12] and Theodor [13].

Lehr [14] still put *Molobratia* into the tribe Dioctrinini of the subfamily Stenopogoninae. However, *Molobratia* may belong to the tribe Dasypogonini (of the subfamily Dasypogoninae) which is characterized by the presence of a large twisted or sigmoid spine at the apex of fore tibia, although this spine rarely disappears individually or specifically (after Wood [15], p. 554). Theodor [10] (p. 171) mentioned that "This [=Dasypogonini] is probably an artificial group as the genera differ markedly in other characters and the spine on the fore tibiae also differs markedly in form and size and probably developed independently in different groups."

For separation of *Molobratia* from the related genera, see key to the genera by Engel [16] (pp. 437–438) ["*Dasypogon*" (=*Molobratia*); "*Selidopogon*" (=*Dasypogon*)]. Theodor [10] diagnosed the genera *Dasypogon, Saropogon* and *Paraphamartania*. Theodor [13] also described and illustrated the male genitalia of several genera of Dasypogonini, that is, *Dasypogon, Saropogon, Molobratia, Paraphamartania, Leptarthrus* and *Neolaparus*.

Molobratia is apparently nearer to *Dasypogon* and *Saropogon* than to *Leptarthrus*. In *Leptarthrus,* spur on fore tibia is bristle-like and antennal style is 2-segmented (after Papavero [12]). Lehr [14] and Papavero [12] put *Leptarthrus* into the tribe Isopogonini (of the subfamily Dasypogoninae).

Genus *Molobratia* Hull

Molobratia Hull, 1958, Proc. ent. Soc. Wash. 60: 251. Type species: *Asilus teutonus* Linnaeus, 1767 (from Europe), by original designation.
Dasypogon, authors, not Meigen, 1803.

Molobratia includes the following 11 species: *chujoi* (Taiwan), *egregia* (Transcaucasia and Caucasia), *inopinata* (Burma), *inopportuna* (Burma), *japonica* (Japan), *kanoi* (Japan), *nipponi* (Japan: Okinawa I. and Amami Oshima), *pekinensis* (China), *purpuripennis* (Taiwan), *sapporensis* (Japan) and *teutonus* (Europe and Turkey).

Molobratia differs from *Dasypogon* by having the following characters: (1) antennal style conical, tapering apically and with a terminal spinule, (2) antennal segment 3 with many stout hairs dorsally, (3) 4th posterior cell (=cell M_3) open, (4) fore basitarsus longer than mid or hind basitarsus, and (5) female tergum 9+10 without a circlet of rod-like spines. In *Dasypogon,* (1) antennal style cylindrical, not tapering apically and its apical concavity with a spinule, (2) antennal segment 3 bare or practically so dorsally, (3) 4th posterior cell closed, (4) fore basitarsus shorter than mid or hind basitarsus, and (5) female tergum 9+10 with a circlet of rod-like spines. (chiefly after Engel [16], p. 438)

Hull [9] (pp. 227–228) wrote that "Many species have been removed from the genus [*Dasypogon*] in recent years and it is probable that comparatively few species properly belong in *Dasypogon sensu stricto*. ·····The species known to properly belong to *Dasypogon* are found in southern Europe and northwestern Africa."

Lehr [14] listed 15 species of *Dasypogon* which are distributed in Europe, North Africa and Asia (Israel, Turkey, and Iran). Weinberg [17–19] added 4 new species of *Dasypogon* from Yugoslavia, Greece, Transcaucasia and Mongolia respectively.

The diagnosis of *Molobratia* based on 5 species (from Japan and Taiwan) is given below. Head: Face without gibbosity, but more or less swollen especially near clypeus; hairs on face longer near clypeus, becoming shorter above and haired area nearly reaching to antennae; front with a tuft of hairs running longitudinally near each side; ocellar tubercle with 1 pair of longer and stouter hairs; antennal style conical or tapering apically and with a terminal spinule; antennal segment 3 with many strong hairs dorsally.

Thorax: Prosternum widely separated from propleura by membranous area; hairs are absent

on median stripe (except mid vitta) and on lateral stripes; *hm* 0, *npl* 2–12, *sa* 1–12, *pa* 1–7, *dc* 2–9, *sc* (on one side) 0–4, according to individual or species; *dc* postsutural (in *sapporensis,* rarely presutural); antepronotum and propleura with strong hairs; metapleural fan weak and accompanied with pile; hypopleura and side of pronotum pilose.

Wing: Fourth posterior cell wide open and anal cell narrowly open or nearly closed.

Legs: Long and not very robust; fore basitarsus longer than mid or hind basitarsus; fore tibia with an apical process having a stout terminal spine directed inward and fore basitarsus with a knob, opposite fore tibial spine; fore tibial process with a row of strong hairs (which may become short in *chujoi*) along inner margin, and area at and before knob in basitarsus with denticles opposite process and spine; each femur with two dorsal setae (which are very short in *chujoi*) near apex and with several setae on other parts, but in *kanoi* dorsal setae near apex 3 (or so) in number.

Abdomen: Elongate, more or less slender; bristles are confined to sides of tergum 1.

Male genitalia (based on 4 Japanese species): Paired gonocoxites (excepting dorsodistal processes) wider than long; in gonocoxite, ventral surface except inner part and outer part of dorsal surface with strong long hairs; gonocoxite with a long dorsodistal process whose base has a vertical conical process directed upward, and with a flat distal inner ventral extension; ventral surface of gonocoxite more or less pointed at apex; in lateral view, dorsodistal process of gonocoxite bilobate and horizontal branch longer and wider than the vertical; gonostylus long, tapering apically, pointed dorsally at apex, and with a row of vertical dorsal hairs; gonocoxal apodeme rather long, but not extending beyond anterior margin of sternum 9 (= hypandrium); sternum 9 triangular, wider than long but comparatively long, and with a transverse row of hairs.

In aedeagus, dorsal and ventral plates form a sigmoid conical tube, having a posteroventral fin flattened laterally (in *japonica, nipponi* and *sapporensis*), whose size and shape vary with species, and apex of this tube is curved upward (in *japonica, kanoi* and *sapporensis*); in ventral or lateral view, base of tube (on one side) consisting of dorsal outer and ventral inner processes; in dorsal view, paired dorsal outer processes forming a large V or U shape; anterior bar of aedeagus is flattened laterally and varies in size and shape with species.

Tergum 9 rather trapezoid, wider basally and covered with strong hairs (except base), some of which are bristle-like on outer margin; in *japonica, nipponi* and *sapporensis,* cerci except apical portions fused with each other; paired cerci rectangular and the middle of apical margin with a deep concavity; cerci with dorsal hairs; sternum 10 with a pair of elongate anterior sclerites which are widened and then pointed; apical (=posterior) margin of sternum 10 rounded or nearly straight and with hairs (except middle).

In the specimen of *nipponi,* the posteroventral fin of aedeagal tube is vertically divided into a pair. It is uncertain whether this separation is accidental or not. This fin is absent in *kanoi* (Fig. 22) and *teutonus* (see Fig. 216 in Theodor [13]).

Female terminalia (based on 4 Japanese species): The ovipositor may be composed of the segments 7–8 or 8. In *Leptarthrus,* the ovipositor is long and composed of the segments 6–8 (see Fig. 273 in Engel [16] and Fig. 213 in Oldroyd [20]). The tergum 9+10 is small and has no rod-like spines. In *Dasypogon,* a circlet of rod-like spines are present on tergum 9+10 (see Fig. 216 in Oldroyd [20] and Fig. 34 in Theodor [10]).

A pair of sclerotized cerci are usually separated, but sometimes fused with each other individually; each cercus roughly elliptic (except basal portion), longer than wide, and with strong hairs. Tergum 9 +10 (or tergum 10) membranous, rectangular, and much wider than long. Sternum 10 composed of posterior trapezoid part having strong hairs and a pair of anterolateral bare darkened sclerites. Tergum 8 trapezoid, semicircular or its anterior margin with a wide and deep concavity according to species; tergum 8 except anterior part with dorsal hairs. Sternum 8 semicircular or roughly pentagonal according to species and with ventral hairs. Tergum 7 and sternum 7 rectangular, haired, and wider than tergum 8 and sternum 8; tergum 7 wider than sternum 7. Genital fork large and U-shaped.

Key (a) to species of *Molobratia* from Japan and Taiwan based on external characters

1. Legs and abdomen entirely dark brown to black 2
— Legs largely and abdomen partly yellowish (or reddish) brown 3
2. Face, cheek and base of proboscis with pale yellow hairs; legs with white and black hairs; sides of abdominal dorsum with long white hairs (after Matsumura [3]); (Taiwan) ..... *M. purpuripennis*
— Hairs on head wholly black; legs without white hairs; hairs on abdomen (except cerci) wholly black; (Japan: Honshu) ..... *M. kanoi*
3. Face at antenna much narrower than width of one eye (Figs. 21, 33); in fore and mid tibiae some setae longer than thicknesses of tibiae (as well as in hind tibia in *kanoi* and *sapporensis* [Figs. 43, 44]) 4
— Face at antenna about as wide as one eye; in fore and mid tibiae all setae shorter than thicknesses of tibiae as well as in hind tibia (Fig. 42); in sigmoid terminal spine of fore tibia, apical black part about 1/2 as long as basal yellowish brown part (Fig. 1) (as in *kanoi*); (Taiwan) ..... *M. chujoi*
4. In sigmoid terminal spine of fore tibia, apical black part over 1/2 as long as basal yellowish brown part (Fig. 34) 5
— In sigmoid terminal spine of fore tibia, apical black part less than 1/2 as long as basal yellowish brown part (Fig. 24); face wider than in *sapporensis* (Fig. 21); (Japan: Okinawa I. and Amami Oshima) ..... *M. nipponi*
5. Face wider than in *sapporensis*; humeral and posterior calli and scutellum may be brown (as in *nipponi*); abdominal tergum 1 yellowish brown (as in *nipponi*); no pale yellowish gray spots at postero-lateral corners of abdominal terga 2–6 ; scutellum with many hairs (as in *nipponi*); (Japan: Honshu, Shikoku and Kyushu) ..... *M. japonica*
— Face narrower than in *japonica* (Fig. 33); humeral and posterior calli and scutellum dark brown to black; abdominal tergum 1 shining blue black; abdominal terga 2–6 with distinct pale yellowish gray pollinose spots at posterolateral corners (as in *nipponi*); scutellum with no or few hairs; (Japan: Hokkaido, Honshu, Shikoku and Kyushu) ..... *M. sapporensis*

Key (b) to species of *Molobratia* from Japan based on male genitalia

1. Posteroventral fin of aedeagal tube present (Figs. 9, 26, 36); cerci fused (except their apical portions) (Fig. 6); horizontal branch (in dorsodistal process of gonocoxite) with a minute apical seta (Figs. 8, 26, 35) 2
— Posteroventral fin of aedeagal tube absent (Figs. 20); each cercus apparently separate ; horizontal branch (in dorsodistal process of gonocoxite) with two thicker apical teeth, of which dorsal one is pointed (Fig. 19) ..... *M. kanoi*
2. Apex of aedeagal tube curved upward (Figs. 9, 36); posteroventral fin of aedeagal tube longer than in *nipponi* (Figs. 9, 36); anterior bar of aedeagus much narrower than in *nipponi* and not circular (Figs. 9, 36); horizontal branch in dorsodistal process of gonocoxite narrower than in *nipponi* at apical portion and without a sclerotized oblique line (Figs. 8, 35) 3
— Apex of aedeagal tube directed forward (Fig. 27); posteroventral fin of aedeagal tube shorter than in *japonica* and *sapporensis* (Fig. 27); anterior bar of aedeagus much wider than in *japonica* and *sapporensis* and somewhat circular (Fig. 27); horizontal branch in dorsodistal process of gonocoxite wider than in *japonica* and *sapporensis* at apical portion and with an oblique sclerotized line (Fig. 26) ..... *M. nipponi*
3. Posteroventral fin of aedeagal tube bluntly pointed at anterodistal corner (Fig. 9); anterior bar of aedeagus in lateral view wider apically and then narrowed (Fig. 9). ..... *M. japonica*
— Apical part of posteroventral fin in aedeagal tube wider than in *japonica* (Fig. 36); anterior bar of aedeagus without narrowed anterior (=apical) portion (except dorsal corner) (Fig. 36). ..... *M. sapporensis*

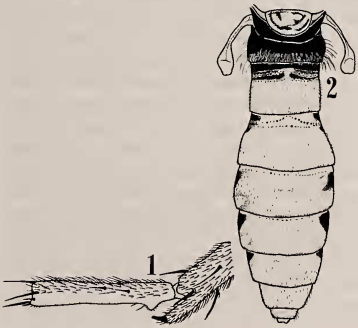
Key (c) to species of *Molobratia* from Japan based on female terminalia

1. Tergum 8 much shorter than in *nipponi* and with anterior margin gently concave (Figs. 13, 39); sternum 8 rounded apically (Figs. 14, 40) 2
— Tergum 8 much longer than in *japonica, kanoi* and *sapporensis* and with anterior margin deeply concave (Fig. 31); sternum 8 (not flattened out) in ventral view is rather pentagonal, although its narrow posterior margin may be straight (Fig. 32). ..... *M. nipponi*
2. Sternum 8 wider and shorter than in *kanoi* and *sapporensis* and with a large and wide bare membranous posterior part (Fig. 14). ..... *M. japonica*
— Sternum 8 narrower and longer than in *japonica* and with a bare membranous posterior part small and narrow (Fig. 40). ..... *M. kanoi* and *M. sapporensis*

Molobratia chujoi Nagatomi, Imaizumi et H. Nagatomi sp. n.
(Figs. 1, 2, 42)

This species (♀) is similar to *japonica, nipponi* and *sapporensis,* but may easily be separated from them by having the external characters shown in the key (a) (couplet 3).

The following description is based on a single female specimen whose antennal segment 3 and hind tarsomeres 3–5 are lacking.



Female. Head: Dark brown to black, and pale yellowish gray tomentose; antenna yellowish brown; palpus, labellum, midventral part of theca, and ocellar triangle shining black; vestiture on head pale yellow, but that on ocellar triangle, area behind ocellar triangle, upper occiput, front, palpus (except base) and antennal segments 1–2 black; hairs behind ocellar triangle short; width of one eye at greatest point 0.5 times length (= height) of eye, 0.9 times width of face at antenna, and 2.4 times distance from antenna to median ocellus; width of front at median ocellus 0.9 times width of face at lowest portion from a direct frontal view, 4.2 times width of ocellar triangle, and 2.6 times distance from antenna to median ocellus; ocellar triangle as wide as long; distance from antenna to median ocellus 0.24 times distance from antenna to lower margin of eye, which is 1.4 times length of face (minus clypeus); when measured along midouter surface, relative lengths of antennal segments 1–2 [segment 3 lacking] 100:62 and their relative widths from the side 62:62.

Thorax: Dark brown to black, and pale yellowish gray (or pale gray) tomentose; mesonotum with 3 broad darker stripes, of which median one is separated by mid vitta and the lateral ones may be obscure in demarcation; hairs and bristles on mesonotum and antepronotum black; hairs on mesonotum very short; hairs on sides of pronotum chiefly black; hairs on pleura pale yellow; *scutellum without hairs and bristles.*

Wing: Membrane yellowish brown to brown; veins yellowish brown to dark brown; halter yellowish (or reddish) brown.

Legs (Figs. 1, 42): Yellowish (or reddish) brown; claw except base black; coxae dark brown to black and pale yellowish gray tomentose; hind femur may have a darkened streak on posteroventral surface; fore and mid trochanters at ventral apices and hind trochanter at anterior part, each with a small shining black spot; apex of each femur with a pair of lateral shining black spots; coxae pale yellow pilose; femora with very short black

FIGS. 1–2. *Molobratia chujoi*, female. 1, Fore basitarsus and apical portion of fore tibia, anterior view; 2, abdomen (including scutellum, postcutellum and halteres), dorsal view.

hairs and short setae; all bristles on tibiae shorter than thicknesses of tibiae; in sigmoid terminal spine of fore tibia, apical black part about 1/2 as long as basal yellowish brown part; relative lengths of segments (excuding coxa and trochanter) of fore leg 205:200:100:35:28:23:30, of mid leg 213:220:65:30:25:23:30, of hind leg 230:233:80:33:?:?:? and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1–2, 33:30:23:20.

Abdomen (Fig. 2): Yellowish (or reddish) brown; tergum 1, anterior part (before sensory pits) of tergum 2, anterolateral spots on terga 2–6 dark brown to black; sternum 1 and sterna 4–6 (excepting posterior parts) darkened; anterolateral spots on terga 2–3 nearly extending to posterior margin; terga 2–5 with posterolateral yellowish (or pale) gray pollinose spots; dorsum with short recumbent pale yellow pile which becomes longer and bristle-like on sides of tergum 1; venter with recumbent pale yellow pile which is erect on sterna 1–3.

Genitalia: Not examined.

Length: Body 20.1 mm; wing 16.5 mm; fore basitarsus 2.53 mm.

Male. Unknown.

Distribution. Taiwan.

Japanese name: Chûjô-ashinaga-mushihiki.

Holotype: ♀, Sozan, 30. iv. 1933, M. Chûjô.

Holotype is deposited in National Institute of Agro-Environmental Sciences, Tsukuba.

This species is named in honour of Dr. Michio Chûjô, a famous Coleopterist.

Molobratia japonica (Bigot)
(Figs. 3–14)

Dasypogon japonicus Bigot, 1878, Annal. Soc. Entom. France, ser. 5, 8: 411. Type locality: Japan.
Dasypogon takasagense Matsumura, 1916, Thous. Ins. Jap. Addit. 2, p. 322. Type locality: Japan (Takasago, Harima, Honshu). **Syn. n.**
Molobratia japonica Hisamatsu, 1965, Icon. Ins. Jap. Colore Nat. Edita, 3: 202.

One of us (Nagatomi) examined the type (♀) of *takasagense* and no significant difference was found between *takasagense* and *japonica*. Hradský [4] separated *takasagense* from *japonica* by the blackened pattern on abdominal terga 2–7. However, this character is variable within species and not relied upon.

M. japonica was recorded from Taiwan [21] and Ryukyu Is. [22], but it is highly probable that *chujoi* from Taiwan and *nipponi* from Okinawa I. and Amami Oshima were misidentified as *japonica*.

Among the Japanese species having the yellowish brown legs, *japonica* is characterized as follows: in both sexes, face distinctly wider than in *sapporensis*, and abdominal terga 2–6 without distinct pale yellowish gray pollinose spots at posterolateral corners; posteroventral fin of aedeagal tube bluntly pointed at anterodistal corner, and anterior bar of aedeagus in lateral view wider apically and then narrowed; female sternum 8 with a large bare membranous posterior part.

Male. Head: Dark brown to black, and pale yellowish gray pollinose; antenna (except style) and hypopharynx yellowish brown; palpus, lebellum, midventral part of theca, and large part of ocellar triangle shining black; vestiture on head pale yellow but that on ocellar triangle, front opposite ocellar triangle, and antennal segments 2–3 black; in the specimens on hand from Kyushu, vestiture on cerebrale, some strong hairs on upper occiput, hairs on antennal segment 1 and dorsoproximal part of palpus black; width of one eye at greatest point 0.5–0.6 times length (=height) of eye, 1.6–1.9 times width of face at antenna, and 2.0–2.4 times distance from antenna to median ocellus; width of front at median ocellus 0.6–0.8 times width of face at lowest portion from a direct frontal view, 2.0–2.8 times width of ocellar triangle, and 1.1–1.5 times distance from antenna to median ocellus; width of ocellar triangle 0.9–1.0 times its length; distance from antenna to median ocellus 0.3–0.4 times that from antenna to lower margin of eye, which is 1.3–1.5 times length of face (minus clypeus); antenna 0.8–0.9 times length (= height) of eye and 3.0–3.4 times distance from antenna to median ocellus; when measured along midouter surface, relative lengths of antennal segments 1, 2, 3, and style (including spinule) 100:83(71–91):251(233–273):97(83–108) and their relative widths from the side (except style) 56(50–67):61(57–67):54(43–67); data based on 10 specimens.

Thorax: Dark brown to black, and pale yellowish gray pollinose; humeral and posterior calli and scutellum may be yellowish brown to brown; mesonotum with 3 braod darker stripes, of which median one is separated by mid vitta and the lateral ones may be obscure in demarcation; hairs and bristles on mesonotum and scutellum chiefly or wholly black and those on pleura pale yellow; in the specimens on hand from Kyushu, hairs on antepronotum black.

Wing: Membrane yellowish brown to brown; veins brown to dark brown; halter yellowish brown to brown.

Legs: Yellowish brown, claw except base black; fore and mid trochanters at ventral apices, and hind trochanter at anterior part, each with a small shining black spot; apex of femur (except ventral part) shining black; coxae pale yellowish gray pollinose and pale yellow pilose; femora with short black hairs which become longer and chiefly pale yellow on ventral surfaces (excepting apical portions); some setae on fore and mid tibiae longer, and all setae on hind tibia not longer than thicknesses of tibiae; in sigmoid terminal spine of fore tibia, apical black part over 1/2 as long as basal yellowish brown part; relative lengths of segments (excluding coxa and trochanter) of fore leg 211(200–221):252(237–288):100:30(28–33): 24(21–26) : 21(19–22) : 27(26–29), of mid leg 224(216–238) : 247(235–257) : 68(65–71) : 27(26–28) : 23(21–25) : 19(18–21) : 28(26–29), of hind leg 234(223–246) : 255(238–264) : 80(77–83) : 31(27–33):25(22–26):22(21–23):30(28–31), and in hind leg from the side, relative widths of femur, tibia and tarsal segments 1–3, 26(24–28):25(23–28): 19(18–21):17(15–19):16(15–18); (N=10).

Abdomen: Yellowish brown, but terga 5–6 shining black, sometimes as well as tergum 7 (except posterior part), anterior border and posterior margin of tergum 4, anterior border of tergum 1 and anterolateral parts of terga 2–3; dorsum with short black hairs which become pale yellow and partly bristle-like on sides of tergum 1 and wholly or partly pale yellow on lateral borders of terga 1–7 and posterior part of tergum 7; venter pale yellow pilose; hairs on genitalia either chiefly pale yellow or chiefly black; hairs on sterna 1–2, sides of terga 1–2 and genitalia longer; anterior parts of terga 1–6 (which are large on terga 2–3) and posterior parts of sterna 1–6 bare.

Genitalia (Figs. 3–10): In dorsodistal process of gonocoxite, horizontal branch narrower than in *nipponi* at apical portion and without an oblique sclerotized line; in aedeagus, apex of tube curved upward, apical part of posteroventral fin narrower than in *sapporensis,* anterior bar in lateral view wider apically (=anteriorly) and then narrowed and with a darkened inner patch which is longer than wide and rectangular; tube denticulate along lateral margin (except apical portion) and at ventral distal part; in each anterior sclerite of sternum 10, widened part and narrowed process are distinct or abrupt in gradation.

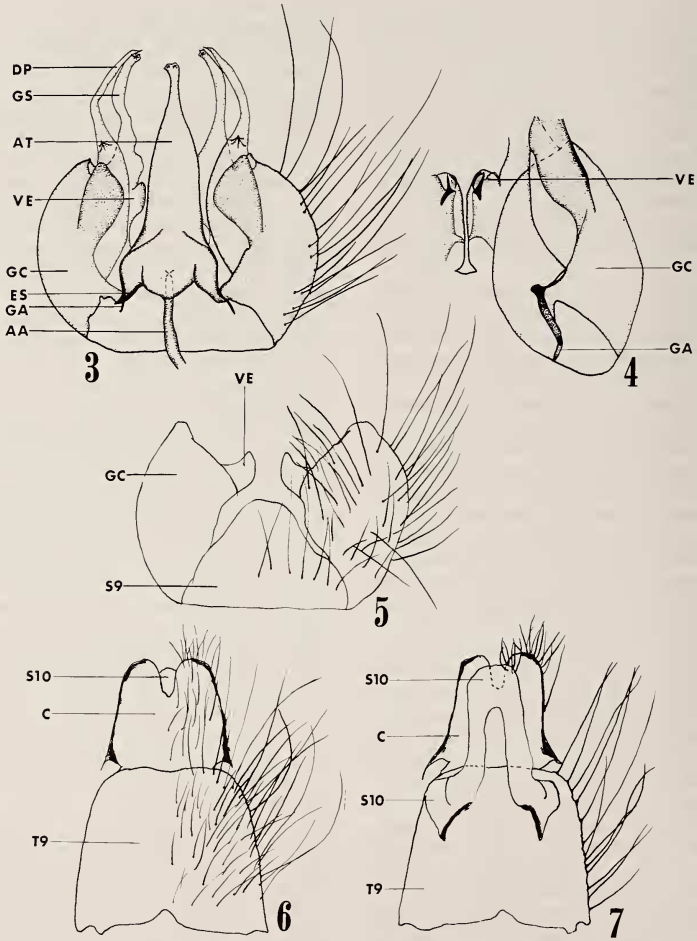
Specimens dissected: 2♂♂, Kagoshima City 22 & 27. v. 1961, A. Nagatomi.

Length: Body 19.9–24.4 mm; wing 15.3–19.0 mm; fore basitarsus 2.5–3.2 mm.

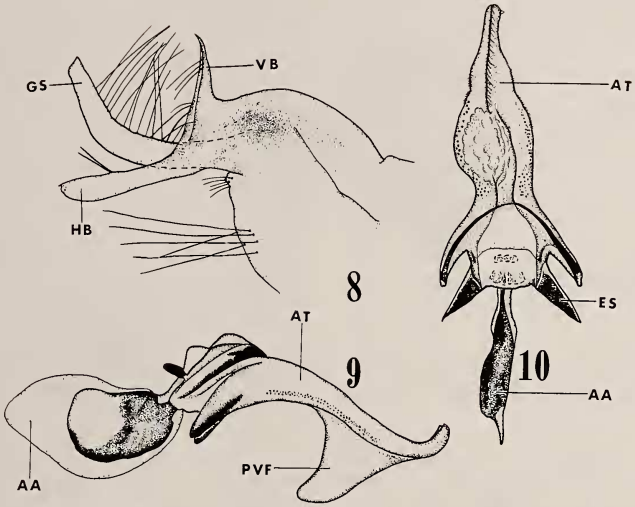
Female. Similar to male except as follows: Head: In some specimens from Kyushu, hairs on antennal segment 1 and on dorsoproximal part of palpus pale yellow as in those from Honshu (this may be so in ♂); no significant structural differences are found between sexes; in 10 specimens measured, width of one eye at greatest point 2.0–2.6 times distance from antenna to median ocellus; width of front at median ocellus 1.2–1.7 times distance from antenna to median ocellus; ocellar triangle 1.0–1.1 times as wide as long; antenna 2.9–3.8 times distance from antenna to median ocellus; when measured along midouter surface, relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:87(71–100): 246(200–283):98(79–140) and their relative widths from the side (except style) 57(43–70): 62(57–70):53(43–60).

Legs: Relative lengths of segments of fore leg 210(198–219) : 245(236–263) : 100 : 30(27–33): 23(21–25) : 19(16–21) : 28(25–30), of mid leg 224(219–233) : 246(240–256) : 66(63–68) : 27(26–28):23(21–24):19(17–21):28(25–30), of hind leg 224(216–231) : 246(239–256) : 76(71–80) : 29(23–31):24(21–26):22(19–23):29(27–31) and in hind leg from the side, relative widths of femur, tibia and tarsal segments 1–3, 27(25–29):26(24–28): 20(19–23):18(16–19):17(14–19); (N=10).

Abdomen: Pile on tergum 8 (except sides) may



FIGS. 3–7. Male genitalia of *Molobratia japonica*. 3–4, Dorsal view (in Fig. 4, aedeagus is excluded); 5, ventral view; 6, dorsal view; 7, ventral view. AA, anterior bar of aedeagus; AT, aedeagal tube; C, cercus; DP, dorsodistal process; ES, endophallic sclerite; GA, gonocoxal apodeme; GC, gonocoxite; GS, gonostylus; S9, Sternum 9; S10, sternum 10; T9, tergum 9; VE, inner ventral extension of gonocoxite.



FIGS. 8–10. Parts of male genitalia of *Molobratia japonica*. 8, Gonostylus and dorsodistal process of gonocoxite, outer lateral view; 9–10, aedeagus, lateral and ventral views. AA, anterior bar of aedeagus; AT, aedeagal tube; ES, endophallic sclerite; GS, gonostylus; HB, horizontal branch of dorsodistal process in gonocoxite; PVF, posteroventral fin in aedeagal tube; VB, ventral branch of dorsodistal process in gonocoxite.

be wholly black; pile on cercus pale yellow.

Genitalia (Figs. 11–14): Tergum 8 rather trapezoid, much wider than long, and with anterior margin gently concave; sternum 8 rounded apically and narrower apically than in tergum 8 and with a large bare membranous posterior part.

Specimens dissected: 1♀, Sueyoshi, Kagoshima Pref., 4. v. 1954, S. Taniguchi; 1♀, Iso, Kagoshima City, 27. v. 1961, A. Nagatomi.

Length: Body 19.0–24.5 mm; wing 17.5–20.1 mm; fore basitarsus 2.7–3.4 mm.

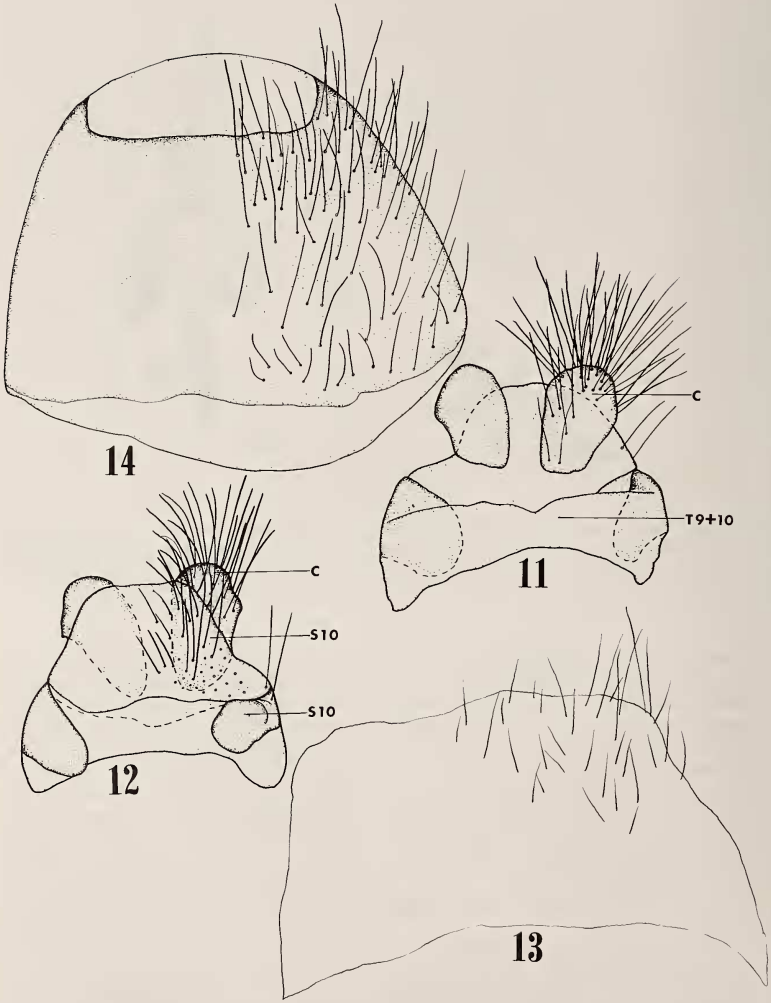
Distribution. Japan (Honshu, Shikoku, and Kyushu).

Japanese name: Ashinaga-mushihiki.

Specimens examined (16♂♂, 33♀♀). HONSHU (7⚥⚥, 12♀♀). *Niigata Pref*: 1♂, 1♀, Okutadami, M-Echigo, 25–26. vii. 1955, K. Baba; 1♂, Okutadami, M-Echigo, 26. vii. 1955, Y. Ohmori; 1♀, Nakajo, N-Echigo, 28. vi. 1953, K. Baba; 1♀, Kurokawa, N-Echigo, 1. vii. 1953, K. Baba; 1♀, Kurokawa, N-Echigo, 11. vi. 1954, K. Baba; 1♀, Kurokawa, N-Echigo, 14. vi. 1956, K. Baba. *Tokyo Pref*: 1♀, 23. vi. 1949, Minamitama, N. Fukuhara; 2♂♂, Suginami, 28. v. 1951, N. Fukuhara; 1♀, Minamitama, 17. vi. 1952, I. Hattori; 1♀, 29. v. 1961, J. Minamikawa; 1♀, Kodaira City, 29. v. 1964, J. Minamikawa; 1♀, Takaosan, 5. vii. 1949, I. Hattori. *Yamanashi Pref.*: 1♀, Kanayama, 30. vi. 1963, A. Nagatomi. *Nagano Pref.*: 1⚥, Kaida-kôgen, 30–31. vii. 1971, A. Nagatomi. *Aichi Pref.*: Uradani, 14. vi. 1977, K. Ôhara. *Hyogo Pref.*: 1♀ (type pf *Dasypogon takasagense* Matsumura), Takasago, Harima, S. Matsumura.

SHIKOKU (1♀). *Ehime Pref.*: 1♀, Matsuyama, 16. v. 1951, T. Shiraki.

KYUSHU (10♂♂, 18♀♀). *Kumamoto Pref.*: 1♂, 1♀, Gokanosho, 21. vii. 1968, A. Nagatomi;



Figs. 11–14. Female terminalia of *Molobratia japonica*. 11–12, Cerci and tergum 9+10, dorsal and ventral views; 13, tergum 8, dorsal view; 14, sternum 8, ventral view. C, cercus; S10, sternum 10; T9+10, tergum 9+10.

1♀, Gokanosho, 20. vii. 1968, R. Ôishi. *Miyazaki Pref.*: 1♂, Mt. Wanizuka, 23. v. 1966, A. Tanaka; 1♀, Aoidake, 29. v. 1950, S. Kato; 1♀, Kurosonkyo, Ebino City, 18. v. 1976, K. Nicho. *Kagoshima Pref.*: 1♀, Mt. Kirishima, 25. v. 1967, A. Tanaka; 1♀, Imuta-ike, 16. v. 1965, A. Tanaka; 1♀, Akano, Aira-cho, 8. v. 1981, M. Nagayoshi; 1♂, Kagoshima City, 22. v. 1961, A. Nagatomi; 1♂, 1♀, Iso, Kagoshima City, 27. v. 1961, A. Nagatomi; 1♀, Iso, Kagoshima City, 4. vi. 1961, A. Nagatomi; 1♂, 1♀, Iso, Kagoshima City, 19. v. 1963, A. Nagatomi; 2♀♀, Toso, Kagoshima City, 8. v. 1963, K. Kusigemati; 1♂, Toso, Kagoshima City, 16. v. 1963, A. Nagatomi; 1♂, Ono-cho, Kagoshima City, 22. iv. 1964, A. Tanaka; 1♀, Sueyoshi, Ôsumi, 4. v. 1954, S. Taniguchi; 1♂, 1♀, Sata, 27–28. iv. 1962, A. Nagatomi; 3♀♀, Shimadomari, Sata, 1. v. 1966, A. Tanaka; 1♂, 1♀, Tanegashima, 3–5. v. 1984, S. Yamane; 1♂, Tanegashima, 4. v. 1983, K. Tomiyama.

LOCALTY UNKNOWN. 1♀, F. Ishitani; 1♀, no data.

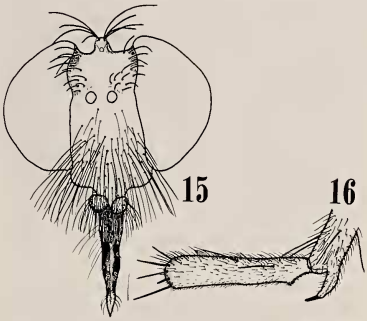
Molobratia kanoi Hradský
(Figs. 15–20, 43)

Molobratia kanoi Hradský, 1980, Trav. Mus. Hist. nat. Gr. Antipa, 22: 453. Type locality: "Meobashi Gummo" (=Maebashi, Gumma Pref., Honshu), Japan.

This species is easily separated from other three Japanese species by having the legs and abdomen entirely dark brown to black and the face wide.

This species is similar to *M. purpuripennis* (Matsumura, 1916) known from Taiwan. Judging from the original description, *purpuripennis* may be distinguished from *kanoi* in the face, cheek, and base of proboscis with pale yellow hairs, legs with white and black hairs, and sides of abdominal dorsum with long white hairs.

Male. Head: Dark brown to black, somewhat velvety; face brownish gray tomentose; labellum shining; vestiture on head wholly black; width of one eye at greatest point 0.5 times length (= height) of eye, equal to width of face at antenna, and 2.5 times distance from antenna to median ocellus; width of front at median ocellus 0.8 times width of face at lowest portion from a direct frontal view, 3.8 times width of ocellar triangle, and 2.5 times distance from antenna to median ocellus; width of ocellar triangle equal to its length; distance from antenna to median ocellus 0.24 times that from antenna to lower margin of eye, which is 1.3 times length of face (minus clypeus); antenna 0.9 times length (=height) of eye and 4.4 times distance from antenna to median ocellus; when measured along midouter surface, relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:67:233:42 and their relative widths from the side (except style) 58:50:58.



Figs. 15–16. *Molobratia kanoi.* 15, Female head, anterior view; 16, male fore basitarsus and apical portion of fore tibia, anterior view.

Thorax: Dark brown to black, somewhat velvety, and more or less brownish gray tomentose; mesonotum with 3 broad stripes where tomentum is denser; median stripe is divided by thin vitta, all hairs or bristles on thorax black; scutellum (on one side) with 3-4 bristles or bristle-like hairs.

Wing: Membrane tinged with dark brown to black; costal cell, subcostal cell, basal portion of marginal cell, etc. may be darker; veins dark brown to black; halter dark brown to black, brownish gray pollinose.

Legs (Fig. 16): Entirely black; pulvilli, empodium, and base of claw yellowish brown; coxae same as pleura and rest of legs with a blue luster; coxae and trochanters with black hairs; each femur

with 3 (or so) dorsal setae near apex and its ventral surface without setae and with black longer bristle-like hairs on basal portion; some bristles on fore and mid tibiae longer than the thicknesses of tibiae as in hind tibia; in sigmoid terminal spine of fore tibia, apical black part roughly 1/2 (0.6 times or so) as long as basal yellowish brown part; relative lengths of segments (excluding coxa and trochanter) of fore leg 207:217:100:40:33:27:30, of mid leg 240:250:77:37:30:27:30, of hind leg 253:267:90:37:33:27:30 and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1-3, 27:27:23:20:17.

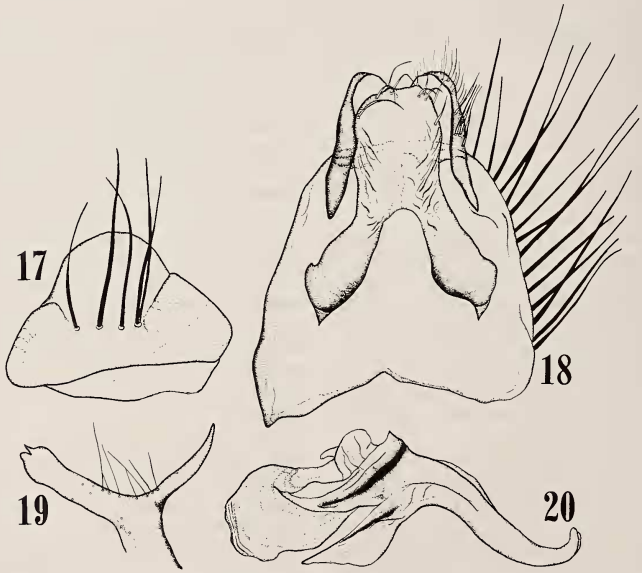
Abdomen: Dark brown to black; dorsum with a blue luster; dorsum with shorter recumbent hairs which become longer on sides of tergum 1; venter with erect hairs which are longer on sternum 1; genitalia with longer erect hairs which become shorter on cerci; all hairs on abdomen black but pile on cerci pale.

Genitalia (Figs. 17–20): In dorsodistal process of gonocoxite, apex of horizontal branch with two thicker teeth, of which dorsal one is pointed; sternum 9 with a row of 4 (or 5) bristles in specimen on hand; in aedeagus, apex of tube curved upward, and posteroventral fin entirely absent; apical portion of tube is denticulate on ventral and lateral surfaces, although denticles are minute; anterior bar of aedeagus in lateral view is rather rectangular (except for basal portion) in shape; each cercus apparently separate; in each anterior sclerite of sternum 10, widened part not much inflate outward.

Specimen dissected: 1♂, Mt. Tateshina, Nagano Pref., 23–25. vii. 1947, A. Aoki.

Length: Body 15.1 mm; wing 12.5 mm; fore basitarsus 1.90 mm.

Female. Similar to male except as follows.



Figs. 17–20. Parts of male genitalia of *Molobratia kanoi*. 17, Sternum 9, ventral view; 18, cerci, sternum 10 and tergum 9, ventral view; 19, dorsodistal process of gonocoxite, outer lateral view; 20, aedeagus, lateral view.

Head (Fig. 15): Tomentum on face (excepting lower part) pale gray (this may often be so in ♂); no significant structural differences are found between sexes; in 1 specimen measured, front at median ocellus 3.0 times width of ocellar triangle and 2.3 times distance from antenna to median ocellus; antenna 4.15 times distance from antenna to median ocellus; relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100: 67:233:50 and their relative widths from the side (except style) 67:50:58.

Legs (Fig. 43): Relative lengths of segments of fore leg 213:213:100:40:33:27:30, of mid leg 233 :230:77:37:33:27:30, of hind leg 250:250:87:40 :33:27:33 and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1–3, 30 :27:23:20:20.

Genitalia: No significant difference is found between *kanoi* and *sapporensis*.

Specimen dissected: 1♀, Mt. Tateshina, Nagano Pref., 23–25. vii. 1947, A. Aoki.

Length: Body 15.1 mm; wing 13.3 mm; fore basitarsus 1.9 mm.

Distribution. Japan (Honshu).

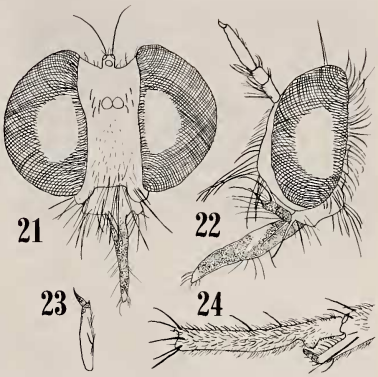
Japanese name: Kano-ashinaga-mushihiki.

Specimens examined: 1♂, 1♀, Mt. Tateshina (2,000 m), Nagano Pref., 23–25. vii. 1947, A. Aoki.

Molobratia nipponi Hradský
(Figs. 21–32)

Molobratia nipponi Hradský, 1980, Trav. Mus. Hist. nat. Gr. Antipa, 22: 454. Type locality: Mt. Yuwan, Amami Oshima, Japan.

Among the Japanese species having the yellowish brown legs, *nipponi* is characterized as follows: in sigmoid terminal spine of fore tibia, apical black part less than 1/2 as long as basal yellowish brown part; face wider than in *sapporensis*; abdominal terga 2–6 with distinct pale yellowish gray pollinose spots at posterolateral corners (as in *sapporensis*); apex of aedeagal tube not curved upward but directed forward; posteroventral fin of aedeagal tube shorter than in *japonica* and *sapporensis*; anterior bar of aedeagus much wider than in *japonica* and *sapporensis* and somewhat circular; female tergum 8 much longer than in *japonica* and *sapporensis* and with anterior margin deeply concave.



Figs. 21–24. *Molobratia nipponi*, male. 21–22, Head, anterior and lateral views; 23, antennal segment 3 and style, outer view; 24, fore basitarsus and apical portion of fore tibia, anterior view.

Male (here described for the first time). Similar to *japonica* except as follows. Head (Figs. 21–23): Often apex of segment 3 darkened (this may be the same in *japonica*); hairs on cerebrale, antennal segment 1, and dorsoproximal part of palpus, and often some strong hairs on upper occiput black (as in the specimens from Kyushu in *japonica*); hairs on face and strong hairs on cerebrale fewer than in *japonica*; width of one eye at greatest point 1.5–1.7 times width of face at antenna (in *japonica*, 1.6–1.9 temes); width of front at median ocellus 2.8–3.3 times width of ocellar triangle (in *japonica*, 2.3–2.8 times) and 1.5–1.8 times distance from antenna to median ocellus (in *japonica*, 1.2–1.7 times); when measured along midouter surface, relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:82(73–89):272(260–300):79(67–89) and their relative widths from the side (except style) 62(55–67):61(55–67):61(50–70); data based on 10 specimens.

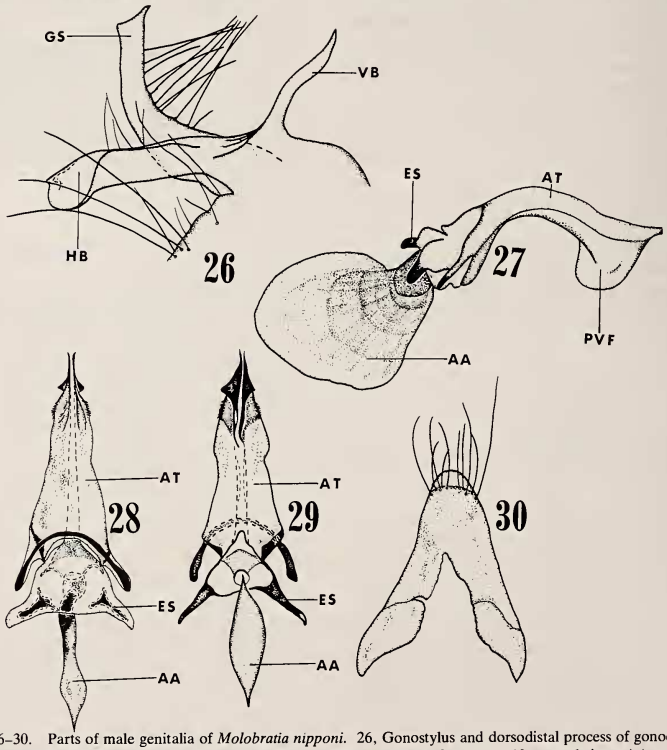
Thorax: Hairs on antepronotum chiefly black.

Wing (Fig. 25): Apical and posterior portions of wing may be more or less darker than rest of

FIG. 25. Male wing of *Molobratia nipponi*.

membrane.

Legs (Fig. 24): Femora have no pale yellow longer hairs; some setae on hind tibia longer than thickness of tibia (as in fore and mid tibiae); in sigmoid terminal spine of fore tibia, apical black part less than 1/2 as long as basal yellowish brown part; relative lengths of segments (excluding coxa and trochanter) of fore leg 193(186-200):205(200–211) : 100 : 35(33–37) : 28(27–29) : 21(19–23): 27(25–29), of mid leg 204(196–211) : 214(203–222) : 71(69–74) : 32(30–33) : 25(24–27) : 20(18–22):26(25–27), of hind leg 214(207–221):



FIGS. 26–30. Parts of male genitalia of *Molobratia nipponi*. 26, Gonostylus and dorsodistal process of gonocoxite, outer lateral view; 27–29, aedeagus, lateral, dorsal and ventral views; 30, sternum 10, ventral view. AA, anterior bar of aedeagus; AT, aedeagal tube; ES, endophallic sclerite; GS, gonostylus; HB, horizontal branch of dorsodistal process in gonocoxite; PVF, posteroventral fin in aedeagal tube; VB, ventral branch of dorsodistal process in gonocoxite.

224(213–232) : 79(75–83) : 33(31–34) : 27(25–30) : 22(21–24) : 26(24–29) and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1–3, 24(22–26) : 22(21–23) : 16(15–17) : 14(13–17) : 13(13–14); (N=9).

Abdomen: Yellowish (or reddish) brown, but anterior borders of terga 4–6 blackened; terga 2–6 with distinct pale yellowish gray pollinose spots at posterolateral corners; hairs on sides of tergum 2 shorter than in *japonica*.

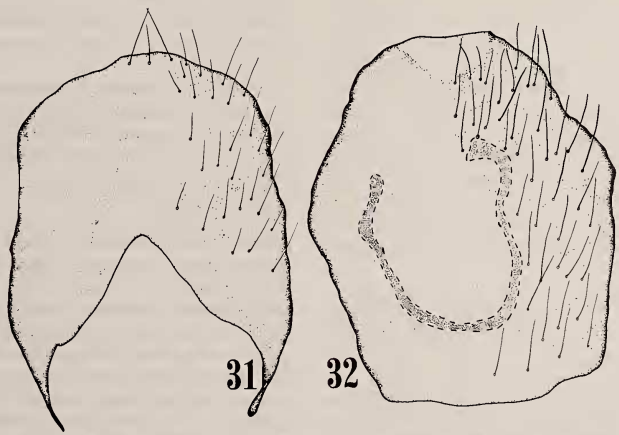
Genitalia (Figs. 26–30): In dorsodistal process of gonocoxite, horizontal branch wider than in *japonica* and *sapporensis* at apical portion and with an oblique sclerotized line; in aedeagus, apex of tube not curved upward but directed forward, posteroventral fin shorter than in *japonica* and *sapporensis* and its apical margin rounded, anterior bar in lateral view much wider than in *japonica* and *sapporensis* and somewhat circular and with darkened patch which is indistinct in demarcation; tube denticulate at ventral surface (except for basal portion) and at antero-[toward base of abdomen] lateral part of ventral fin; in each anterior sclerite of sternum 10, widened part and narrowed part are not abrupt in gradation.

Specimen dissected: 1♂, Shinokawa, Amami Oshima, 15. v. 1953, T. Shiraki.

Length: Body 14.0–18.2 mm; wing 12.3–15.2 mm; fore basitarsus 2.3–2.8 mm.

Female. Similar to male except as follows. Head: Hairs on palpus sometimes wholly pale yellow (this may be the same in ♂); no significant structural differences are found between sexes but this species differs from *japonica* as follows: width of one eye at greatest point 1.4–1.6 times width of face at antenna (in *japonica,* 1.6–1.9 times), width of front at median ocellus 2.7–3.3 times width of ocellar triangle (in *japonica,* 2.3–2.8 times) and 1.6–1.8 times distance from antenna to median ocellus (in *japonica,* 1.2–1.7 times); relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100 : 80(73–83) : 273(250–300) : 74(67–80) and their relative thicknesses (except style) 57(50–60) : 58(50–60) : 58(50–64); data based on 10 specimens.

Legs: Relative lengths of segments of fore leg 196(190–203) : 208(198–216) : 100 : 35(33–37) : 27(25–30) : 21(19–23) : 27(25–29), of mid leg 207(200–214) : 221(212–228) : 71(68–73) : 31(30–32) : 26(24–28) : 20(18–22) : 27(25–29), of hind leg



Figs. 31–32. Parts of female terminalia of *Molobratia nipponi*. 31, Tergum 8, dorsal view; 32, sternum 8, ventral view.

214(206–222) : 227(217–239) : 80(76–83) : 33(31–36) : 27(25–28) : 21(20–22) : 28(25–30) and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1–3, 26(24–28) : 23(22–24) : 18(16–19) : 16(14–17) : 15(14–16); (N = 10).

Abdomen: Sometimes anterior border of tergum 3 and a band along sensory pits on tergum 2 darkened and sometimes abdomen almost wholly yellowish brown (these may be the same in ♂); pile on tergum 8 and cercus pale yellow.

Genitalia (Figs. 31, 32): Tergum 8 much longer than in *japonica* and *sapporensis* and with anterior margin having a wide and deep concavity; sternum 8 (not flattened out) in vertral view is rather pentagonal, although its narrow posterior margin may be straight; posterior bare membranous part of sternum 8 is much smaller than in *japonica*.

Specimens dissected: 2♀♀, Shinokawa, Amami Oshima, 9 & 11. v. 1953, T. Shiraki.

Length: Body 13.6–18.0 mm; wing 12.0–14.7 mm; fore basitarsus 2.1–2.7 mm.

Distribution. Japan (Amami Oshima and Okinawa I.).

Japanese name: Uruma-ashinaga-mushihiki.

Specimens examined (9♂♂, 17♀♀): *Amami Oshima* (9♂♂, 15♀♀): 7♂♂, 8♀♀, Shinokawa, 9–15. v. 1953, T. Shiraki; 1♂, Yuwan, 30. iv. 1953, T. Shiraki; 1♀, Yuwan, 8. v. 1953, T. Shiraki; 1♂, 2♀♀, Naze, 4. v. 1966, K. Kusigemati; 3♀♀, 5 & 10. v. 1966, K. Kusigemati; 1♀, Asato, 12. vii. 1918, T. Shiraki. *Okinawa I.* (2♀♀): 1♀, Mt. Yonaha, 8. iv. 1953, T. Shiraki; 1♀, Izumi, 29. iv. 1969, S. Yamauchi.

There is 1♀ from Okinawa I. (5. v. 1957, T. Takara) whose length is large and 23.4 mm in body, 19.2 mm in wing and 3.5 mm in fore basitarsus. This specimen apparently belongs to *nipponi*.

Molobratia purpuripennis (Matsumura) comb. n.

Dasypogon purpuripennis Matsumura, 1916, Thous. Ins. Jap. Addit. 2, p. 321 & pl. 20, fig. 14. Type locality: Formosa (Horisha).

This species will be redescribed, when new material from Taiwan comes to hand. It is apparently similar to *kanoi* from Japan but may be separated from the latter by having the characters shown in the key (a) (couplet 2).

The original description by Matsumura is as follows. Male: "Fuscous. Head black pubescented, face with pale yellowish hairs. Proboscis at the extreme apex fulvous, at the base and on the cheeks pale yellowish pubescented, tempora and occiput with black hairs. Antennae black, the first 2 joints with black hairs. Thorax short black pubescented, in the middle with 2 longitudinal grayish stripes, humeri and pleurae grayish yellow pruinose. Wing subhyaline, somewhat infuscated, the second basal cell and the middle part being hyaline, in a certain light reflecting a beautiful purple, veins fuscous. Halteres fuscous, the stems fulvous. Abdomen black, with a purple luster, short black pubescented, on the sides with long white hairs, hypopygium with long black hairs. The upper genital plate of the male on each side inflated in an oval form and each sending backwards a long fuscous hook-like projection, the lower plate broad, nearly quadrate, with fulvous hairs. Legs black, with white and black hairs, tibiae mingling some short fulvous hairs.

Length-22.5 mm, exp. 36 mm.

Hab.-Formosa (Horisha); collected by the author."

Female. Unknown.

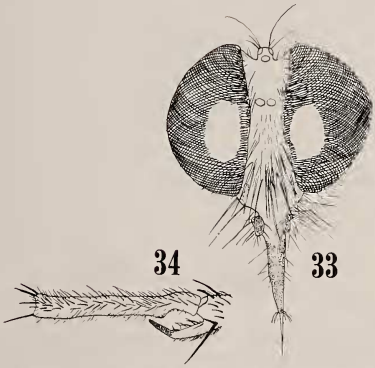
Japanese name: Murasaki-ashinaga-mushihiki.

Molobratia sapporensis (Matsumura)
(Figs. 33–41, 44)

Dasypogon sapporense Matsumura, 1916, Thous. Ins. Jap. Addit. 2, p. 324. Type locality: Japan (Sapporo, Hokkaido).

Molobratia sapporensis Hisamatsu, 1965, Icon. Jap. Colore Nat. Edita, 3: 202.

Among the Japanese species having the yellowish brown legs, *sapporensis* is characterized as follows: in both sexes, face distinctly narrower than in *nipponi* and *japonica*, abdominal tergum 1 shining blue black, abdominal terga 2-6 with distinct pale yellowish gray pollinose spots at posterolateral corners (as in *nipponi*), and scutellum with no or few hairs; apical part of posteroventral fin in aedeagal tube wider than in *japonica*, and anterior bar of aedeagus without narrowed anterior (= apical) portion (except dorsal corner); bare mem-



Figs. 33–34. *Molobratia sapporensis,* male. 33, Head, anterior view; 34, fore basitarsus and apical portion of fore tibia, anterior view.

branous posterior part in female sternum 8 small and indistinct.

Male: Similar to *japonica* except as follows: Head (Fig. 33): Apical portion of antennel segment 3 darkened; hairs on antennal segment 1 and cerebrale and some hairs on upper occiput and palpus black in the specimens from Hokkaido and Honshu as well as those from Kyushu; width of one eye at greatest point 2.3–2.8 times width of face at antenna (in *japonaca,* 1.6–1.9 times); no significant differences are found in other structural characters between *sapporensis* and *japonica*; in 10 specimens measured, width of one eye at greatest point 1.8–2.6 times distance from antenna to median ocellus; distance from antenna to lower margin of eye 1.5–1.7 times length of face (minus clypeus); antenna 2.7–3.4 times distance from antenna to median ocellus; relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:79(67–90):248(220–280):96(75–111) and their relative widths from the side (except style) 57(40–67):59(50–67):54(40–67).

Thorax: Humeral and posterior calli and scutellum are the same as rest of thorax in ground colour; *scutellum with no or few hairs*; hairs on antepronotum often black in the specimens from Honshu (this may be so in *japonica*).

Wing: Apical portion and posterir border of wing and apical portions of costal and subcostal cells more or less darker than rest of membrane.

Legs (Fig. 34): Coxae often largely dark brown to black; in the specimens from Kyushu, tarsi and fore tibia (except inner basal portion) darkened; some bristles on hind tibia longer than thickness of tibia (as in fore and mid tibiae); relative lengths of segments (excluding coxa and trochanter) of fore leg 194(188–200):214(209–222) : 100 : 31(29–34) : 24(22–26) : 19(17–22): 25(24–26), of mid leg 211(203–217) : 220(213–226): 68(65–71) : 27(25–29) : 23(22–24) : 19(17–20) : 25(23–26), of hind leg 217(213–223): 225(220–228) : 76(73–80) : 29(26–31) : 24(23–25): 20(19–21):26(24–28) and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1–3, 23(21–26):21(18–23):16(14–20): 14(13–17):13(11–15); (N=10).

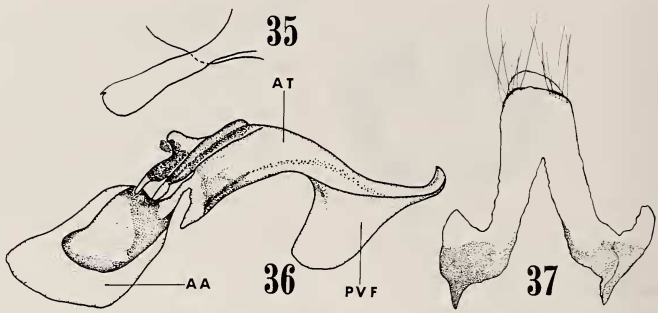
Abdomen: Terga 2-6 with distinct pale yellowish gray pollinose spots at posterolateral corners; tergum 1 shining blue black; in each of terga 2–4, posterior part (except sides) which is variable in extent, and a band along sensory pits shining blue black, as well as anterior border of tergum 2; terga 5–6 (or 5–7) shining blue black as in *japonica.*

Genitalia (Figs. 35–37): In dorsodistal process of gonocoxite, horizontal branch as in *japonica*; in aedeagus, apex of tube curved upwared as in *japonica,* apical part of posteroventral fin wider than in *japonica,* anterior bar wider apically (= anteriorly), then not narrowed and with a darker inner patch as in *japonica*; tube denticulate as in *japonica*; in each anterior sclerite of sternum 10, widened part and narrowed process distinct or abrupt in gradation.

Specimens dissected: 1♂, Sasayama, Hyogo Pref., 28. vi. 1963, T. Ishino; 1♂, Kurinodake, Kagoshima Pref., 7. vi. 1963, A. Nagatomi.

Length: Body 14.0–19.8 mm; wing 11.5–15.1 mm; fore basitarsus 2.2–2.9 mm.

Female. Similar to male except as follows. Head: structural differences are not found between sexes; this species differs from *japonica* as follows: width of one eye at greatest point 2.2–2.7 times width of face at antenna (in *japonica,* 1.6–1.9 times); in 10 specimens measured, width of front at median ocellus 1.1–1.4 times distance



FIGS. 35–37. Parts of male genitalia of *Molobratia sapporensis*. 35, Horizontal branch of dorsodistal process in gonocoxite, outer lateral view; 36, aedeagus, lateral view; 37, sternum 10, ventral view. AA, anterior bar of aedeagus; AT, aedeagal tube; PVF, posteroventral fin in aedeagal tube.

from antenna to median ocellis; width of ocellar triangle 0.8–1.0 times its length; distance from antenna to median ocellus 0.3–0.4 times distance from antenna to lower margin of eye; antenna 2.7–3.4 times distance from antenna to median ocellus; relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:79(67–100): 249(217–300):95(73–113) and their relative widths from the side (except style) 59(55–67): 61(55–75):55(45–75).

Legs: (Fig. 44): In some specimens from Kyushu, tarsi and hind tibia wholly yellowish brown as in those from Hokkaido and Honshu, in extreme cases; relative lengths of segments of fore leg 196(175–203):216(206–226):100:31(28–33): 24(22–26):19(19–20):25(24–27), of mid leg 213(198–225) : 224(213–235) : 67(63–70) : 27(24–29):23(22–24):19(17–20):25(24–28), of hind leg 219(208–229) : 225(217–238) : 76(72–80) : 30(28–31):24(22–26):20(19–22):27(25–28) and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1–3, 24(22–25):22(19–25): 17(14–20):15(14–18):14(11–15); (N=10).

Abdomen: In the specimens from Honshu (probably as well as those from Hokkaido), shining blue black parts of terga 2–4 markedly reduced in extent (bands along sensory pits usually disappear on terga 2–3 or 2–4) and often terga 5-6 largely or partly yellowish brown; pile on tergum 8, cercus and often tergum 7 pale yellow.

Genitalia (Figs. 38–41): Sternum 8 narrower and longer than in *japonica* and its bare membranous posterior part small and indistinct.

Specimens dissected: 1♀, Hataganaru, Ôginosen, Hyogo Pref., 19–23. vii. 1959, A. Nagatomi; 1♀, Suzuka Mountains, Mie Pref., 22. vii. 1962, Z. Yamashita.

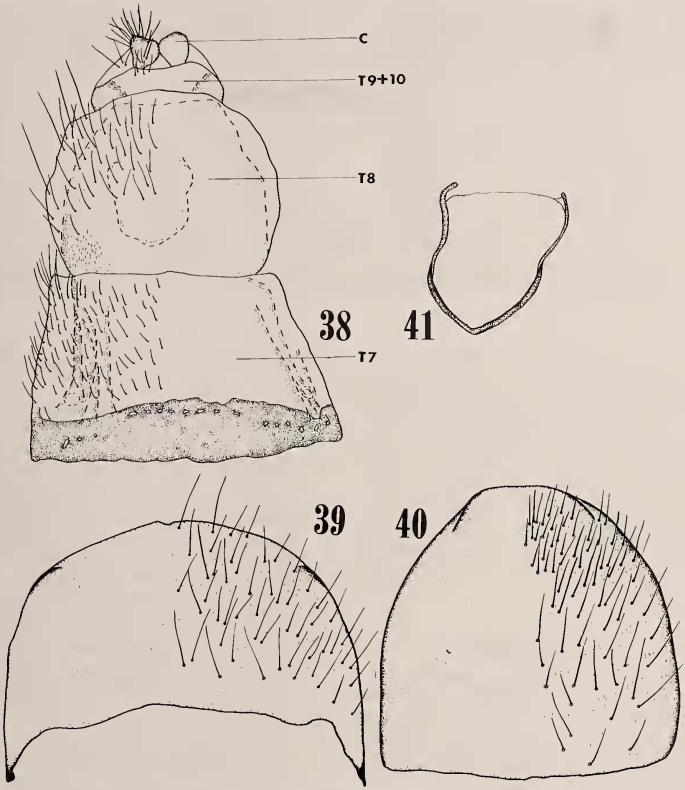
Length: Body 14.9–19.4 mm; wing 12.2–15.7 mm; fore basitarsus 2.2–2.8 mm.

Distribution. Japan (Hokkaido, Honshu, Shikoku and Kyushu).

Japanese name: Sapporo-ashinaga-mushihiki.

Specimens examined (21♂♂, 23♀♀). HOKKAIDO (3♂♂, 1♀). 1♀, Akan, 2. viii. 1939, S. Kinoshita; 2♂♂, Apoi, 27. vi. 1967, K.Kusigemati; 1♀, Touya, 7. vii. 1967, M. Miyazaki.

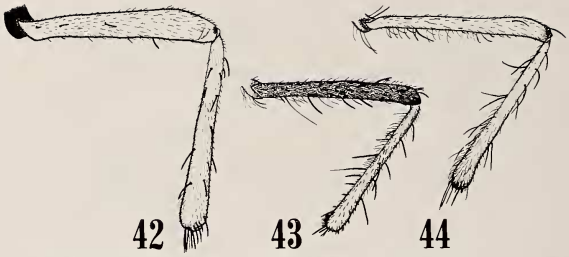
HONSHU (6♂♂, 17♀♀). *Aomori Pref.*: 2♀♀, Tsuta-onsen, 6–7. viii. 1953, I. Hattori. *Niigata Pref.*: 1♂, Yoshigahira, M-Echigo, 3. vii. 1954, Y. Ohmori; 1♀ Kurokawa, N-Echigo, 9. vi. 1955, K. Baba; 1♀, Kurosawadake (1, 900 m), S-Echigo, 16. viii. 1967, K. Baba. *Tokyo Pref.*: 1♀, Hirayama Hill, Minamitama, 6. vii. 1958, I. Hattori. *Nagano Pref.*: 1♀, Narai, 28. vii. 1969, A. Nagatomi. *Ishikawa Pref.*: 1♂, Sannomiya, Tsurugi-machi, 4. vi. 1978, I. Togashi; 1♀, Ohsugidani, 29. vi. 1975, I. Togashi. *Fukui Pref.*: 1♂, Habadaira, Echizen, 16. vii. 1956, K. Iwata. *Mie*



FIGS. 38–41. Female terminalia of *Molobratia sapporensis*. 38, Dorsal view; 39, tergum 8, dorsal view; 40, sternum 8, ventral view; 41, genital fork, ventral view. C, cercus; T7, tergum 7: T8, tergum 8; T9+10, tergum 9+10.

Pref.: 1♀, Suzuka Mountains, 22. vii. 1962, Z. Yamashita. *Kyoto Pref.*: 1♀, Takao, 27. vi. 1955, K. Iwata. *Hyogo Pref.*: 2♂♂, Ôginosen, Tazima, 24-26. vii. 1954, F. Gami; 1♀ Hataganaru, Ôginosen, Tazima, 19–23. vii. 1959, A. Nagatomi; 1♂, Sasayama, Tamba, 28. vi. 1954, T. Ishino; 1♀, Sasayama, Tamba, 12. v. 1951, K. Iwata; 1♀, Sasayama, Tamba, 8. vii. 1951, K. Iwata; 2♀♀, Sasayama, Tamba, 30. vi. 1953, K. Iwata; 1♀, Sasayama, Tamba, 25. vi. 1957, S. Taniguchi. *Shimane Pref.*: 1♀, Saigo, Okinoshima, 26. vii. 1966, H. Kadowaki; 1♀, Araki, Okinoshima, 12. vii. 1968, H. Kadowaki.

KYUSHU (12♂♂, 5♀♀). *Fukuoka Pref.*: 1♂, Mt. Hiko, 26. vii. 1954, S. Kimoto. *Nagasaki Pref.*: 1♂, 1♀,Unzen, 27. vi. 1968, T. Shirozu.



FIGS. 42–44. Female hind femur and tibia of *Molobratia* species, anterior view. 42, *M. chujoi*; 43, *M. kanoi*; 44, *M. sapporensis*.

Ôita Pref.: 2♀♀, Tsukumi, 30. v. 1950, A. Nagatomi. *Kumamoto Pref.*: 2♂♂, Gokanosho, 20. vii. 1966, A. Nagatomi; 2♂♂, Gokanosho, 20–23. vii. 1966, A. Tanaka. *Kagoshima Pref.*: 1♂, 1♀, Kurinodake, 7. vi. 1963, A. Nagatomi; 1♂, Kurinodake, 16. vii. 1967, A. Tanaka; 1♀, Iso, Kagoshima City, 4. vi. 1961, A. Nagatomi; 1♂, Kagoshima City, 23. vi. 1961, A. Nagatomi; 1♂, Takakuma, Ôsumi, 12. vii. 1960, A. Nagatomi; 2♂♂, Sata, Ôsumi, 24 & 27. v. 1952, H. Hasegawa.

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